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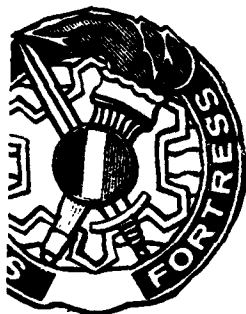
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AN EVALUATION OF ALTERNATIVE METHODS  
OF DEVELOPING THE BASIC TYPING KEYBOARD SKILLS  
OF ADMINISTRATIVE SPECIALISTS, MOS 71110

FINAL REPORT

BY: GENE L. WILKERSON, Ed.D.

1 JULY 1982

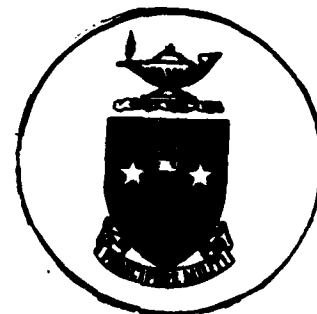
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This report has been reviewed and is approved.

*Frank E. Giunti*

FRANK E. GIUNTI  
Chief, Instructional  
Development Division

*F. A. Nerone*

F. A. NERONE  
Colonel, Infantry  
Director, Training Developments  
Institute

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20. ABSTRACT (Continue on reverse side if necessary and identify by block number) This is the Final Report on a project to operationally test and evaluate methods of developing the basic keyboard skills of the Administrative Specialist, MOS 71L10, at the Army Training Center (ATC), Ft Jackson, SC. The methods evaluated in the test include: (1) the standard method with normal size classes (50 students), (2) the standard method with small classes (25 students), (3) the TAUT 2000 Trainer, and (4) a microprocessor based system. The project was implemented by the Training Developments Institute (TDI), Ft Monroe, VA, in response to Soldier Support Center and ATC (Administration School) request.		

**AN EVALUATION OF ALTERNATIVE METHODS  
OF DEVELOPING THE BASIC TYPING KEYBOARD SKILLS  
OF ADMINISTRATIVE SPECIALISTS, MOS 71L10**

**FINAL REPORT**

**Gene L. Wilkinson, EDD**

**The U.S. Army Training Developments Institute  
Fort Monroe, Virginia 23651**

**April 30, 1982**

Disclaimer

The contents of this report are not to be construed as an official Department of the Army position unless so designated by other authorized documents.

## EXECUTIVE SUMMARY

This project was implemented by the Training Developments Institute (TDI), in response to requests from the Soldier Support Center and the Army Training Center (ATC), Fort Jackson, South Carolina, in order to test and evaluate alternative methods of developing the basic typing keyboard skills of the Administrative Specialist, MOS 71L10, at the ATC.

Typing training is given to individual soldiers during Advanced Individual Training (AIT) at the Administration School, 4th CST Brigade, ATC, Fort Jackson. The Administrative Specialist training program is not just a typing training program but also includes associated academic skills required of an Administrative Specialist. In order to graduate, the student must complete the academic units as well as obtain a minimal typing speed of 25 Net Words Per Minute (NWPM) over a three-day period. Students who enter the AIT with a typing skill level of 15 NWPM are placed in Advanced classes. Students with lower entry typing levels are placed in Basic classes.

The objectives of the test and evaluation were to determine if an alternative method of teaching basic keyboard typing skills would (1) enable average trainees to reach or exceed minimum graduation typing standards in a shorter period of time and (2) produce Administrative Specialists who have a higher level of typing proficiency.

Four methods were tested and evaluated. These were: (1) the current method--platform, classroom instruction in groups of 50 students, referred to as Large Group, (2) a variation of the current method--platform, classroom instruction in groups of 25 students, referred to as Small Group, (3) the Training Associates Universal Trainer system, which utilizes a modified Beseler Cue See and an electronic keyboard console, referred to as TAUT 2000, and (4) the Kee, Inc., microprocessor-based delivery system, referred to as Micro.

The test was conducted from September of 1980 through February of 1982. Three cycles of both Basic and Advanced classes were assigned to the Large Group treatment. Three cycles of Basic and two cycles of Advanced classes were assigned to the Small Group treatment. Three cycles of Basic classes were assigned to the TAUT 2000 and three cycles of both Basic and Advanced classes were assigned to the Micro treatments. A total of 778 students were included in the final analysis.

The test was carried out under normal operating procedures at the ATC. It was not a controlled experiment. As a result, a number of problems were encountered in the test due to the real world nature of the test environment. Students completed the course on a self-paced basis, causing problems due to differences in the total number of training days and the effects of practice on typing speed. Problems also arose due to turn over of personnel and to procurement of the experimental systems. To the extent possible, the problems have been dealt with in the report.

Entry measures on each student were taken of educational level, reading level, and typing level in order to determine the equivalency of the different groups under each of the treatments. Analysis demonstrated that there was no statistically significant differences, except that the advanced

students under the Micro treatment scored significantly higher on entry typing, causing difficulties with interpretation of results for the Advanced classes.

Outcome measures were taken which were related to four broad areas--effectiveness, efficiency, acceptance, and cost. In regard to measures of effectiveness, End-of-Course test scores indicate that the Small Group treatment is better than either of the two electronic-based systems, but it is not better than the Large Group treatment for the basic students. Once differences in entry levels are accounted for, there is no difference between the groups at the advanced level. On measures of efficiency, once differences in training time are allowed for, there is no difference between the groups. There is a slight gain in training time from reduction of class size, but the cost savings from reduced student time in training would be more than offset by the increase in costs for instructors and facilities. On measures of cost, both of the electronic systems represent added cost since they are in addition to, and do not represent a displacement of, the cost of the current system. On measures of acceptance, the instructors were negative toward the new systems, but the strongly positive responses of the students would more than counter such reactions.

On the basis of the evidence presented, it is possible to make the statement that each of the systems examined is capable of developing the basic keyboard typing skills of the students. However, it is not possible to say that any one system is the "better" system in all cases. Since the current system of typing instruction appears to be working as well as any of the alternatives evaluated, the recommendation of the report is that none of the experimental treatments be adopted for wide use at the Administration School, Fort Jackson, at this time, and that the current system of typing training be maintained.

The recommendation from this evaluation does not preclude further experimentation or testing of electronic-based delivery systems for use in keyboard training. The recommendation is for the present time only, and is based on the specific systems examined in this test. It may well be that other systems, employing the same, or variations of the tested, delivery formats might well produce a different conclusion.



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## 1. INTRODUCTION

This is the final report on a project to operationally test and evaluate methods of developing the basic typing keyboard skills of the Administrative Specialist, MOS 71L10, at the Army Training Center (ATC), Fort Jackson, South Carolina. The methods evaluated in the test include: (1) the standard method with normal size classes (50 students), (2) the standard method with small classes (25 students), (3) the TAJT 2000 trainer, and (4) a microprocessor based system. The project was implemented by the Training Developments Institute (TDI), Fort Monroe, Virginia, in response to Soldier Support Center and ATC (Administration School) request.

### Background

Typing training is given to individual soldiers during Advanced Individual Training (AIT) for Military Occupational Specialty (MOS) 71L10, Administrative Specialist, at the Administration School, 4th CST Brigade, ATC, Fort Jackson. The Administrative Specialist training program is not just a typing training program but also includes associated academic skills required of an MOS 71L10 Administrative Specialist. In order to graduate, the student must complete the academic units as well as obtain a minimal typing speed of 25 Net Words Per Minute (NWPM) over a three-day period.

At present, incoming students are given a typing test on the first day. Those scoring 0-15 NWPM are placed on a first come, first served basis, in a Basic Class. As soon as 50 students arrive, fundamental keyboard training begins. Keyboard training, practice, and timed writing exercises are conducted for three hours during the mornings of the training period. Work on the academic modules is undertaken in the afternoon. Initially, basic students complete academic module assignments in longhand. When students reach 15 NWPM on timed typing exercises, all assignments must be typed. Academic modules are self-paced. As soon as the modules are satisfactorily completed, and the required 25 NWPM for three days is attained, the student passes on to End-of-Course Testing and graduation.

If incoming students score over 15 NWPM on the entry typing test, they are placed on a first come, first served basis in an Advanced Class. Here they are given self-paced modules containing the academic portion of the training and one hour of timed writings in the afternoon. As soon as the modules are satisfactorily completed and the required 25 NWPM for three days is attained, the student passes on to End-of-Course Testing and graduation.

Evaluation of the alternative instructional strategies were conducted separately for both the Basic and Advanced classes. The methods of instruction evaluated during the test were:

1. The current method: platform, classroom instruction in groups of 50 students (referred to in this report as either Standard--Large Group or Control).
2. A variation of the current method: platform, classroom instruction, in groups of 25 students (referred to as Standard--Small Group).

3. The Training Associates Universal Trainer (TAUT 2000) system, which utilizes a modified Beseler Cue See and an electronic keyboard console, provides an Instant feedback instructional program, in classes of 50 students (referred to as TAUT 2000).

4. The Kee, Inc., microprocessor based delivery system, which also provides instant feedback during instruction and simultaneous scoring of typing tests by means of a microprocessor, in classes of 50 students (referred to as Micro).

At the recommendation of the manufacturer's representative, the TAUT 2000 system was not employed with the Advanced Classes because of the relatively slow response time of the equipment. Although it is intended as a primary keyboard instruction system, the Micro system was employed with the Advanced Classes because it was felt that practice on the system might lead to greater accuracy in production typing.

#### Purpose

This operational test and evaluation was undertaken in order to determine if an alternative method of teaching basic keyboard typing skills would:

1. Enable average AIT trainees to reach or exceed minimum graduation typing standards in a shorter period of time.
2. Produce Administrative Specialists who have a higher level of typing proficiency.

In order to achieve the general purposes of the test and evaluation, a number of specific questions were asked in regard to such measures as days to reach 25 Net Words Per Minute (NWPM), days from 15 to 25 NWPM, rate of skill acquisition, etc. These questions have been grouped under such headings as measures of effectiveness, measures of efficiency, etc., and are discussed in detail in the findings section.

This project is important to the Army because 71L10 is a high density MOS, with 23,000 personnel in Skill Levels 1-5. Greater typing training effectiveness means substantial time and money to the Army.

#### Evaluation Design

The evaluation plan was designed to retain simplicity and clarity of procedure in implementation, data collection, and evaluation, so that the test might be conducted with a minimum of disturbance of normal routines of the ATC. A test monitor and data collector was assigned to the project to work at Fort Jackson. In addition to monitoring the test, the data collector was responsible for gathering student entry, progress, and completion data as called for on the Student Data Form, Form A at Appendix A-1 and A-2. The evaluator was responsible for the collection of instructor opinion data as

called for on the Instructor/Staff Interview Schedule, Form B at Appendix A-3 and A-4.

#### Class Formats--Basic Students

The basic student schedule, for all treatments, was as follows:

Day 1.....all students begin keyboard training  
Day 1-3.....students may pass to Advanced training  
Day 1-10.....keyboard instruction  
Day 11-35+...practice and timed writings

When students attained 15 NWPM, they began production typing. When all academic modules were completed and 25 NWPM for three days had been achieved, they proceeded to End-of-Course testing. Three cycles of Basic Classes were completed for each of the treatment formats presented in Table 1 on the following page.

#### Class Formats--Advanced Students

The advanced student schedule, for all treatments, was as follows:

Day 1...all students begin academic, self-paced modules  
Day 1...all students begin one hour of timed writings each day

This schedule was maintained until students satisfactorily completed all academic modules and attained a speed of 25 NWPM for three days. At that time, students proceeded to End-of-Course Testing and graduation. The amount of time spent on typing practice and timed writings for students under the Micro treatment had to be increased to one and a half hours (half on Micro, half on standard keyboard) to allow time for classroom housekeeping details as well as practice and timed writing. Three cycles of Advanced Classes were completed on the Standard--Large Group and the Micro treatments presented in Table 2 on page 5. Two cycles were completed on the Standard--Small Group treatment.

### Population Description and Treatment

#### Basic Students

Three cycles of classes were assigned on a first come, first served basis to the Standard--Large Group treatment. Of the 150 subjects assigned, 21 were dropped from the analysis because they were either transferred to an Advanced Class, recalled to their unit, AWOL, etc., leaving 129 subjects in the Standard--Large Group treatment. Four cycles of the Standard--Small Group treatment were completed, with 92 of the original 100 subjects left in the analysis. Four cycles of the TAUT 2000 treatment were completed. However, the first cycle had to be discarded due to start-up problems with the system. 127 of the assigned 150 subjects who were in the final three cycles were left in the final analysis. Three cycles of the Micro treatment were completed, with 122 subjects left in the analysis.

Table 1. Treatment Formats for Basic Students

Method/Treatment	Format
Standard--Large Group	<p>50 students 50 standard typewriters</p> <p>Method: platform instruction standard (manual) typing practice</p> <p>Instructors: 1 typing instructor (3 hours) 1 academic instructor (4½ hours)</p>
Standard--Small Group	<p>25 students 25 standard typewriters</p> <p>Method: platform instruction standard (manual) typing practice</p> <p>Instructors: 1 typing instructor (3 hours) 1 academic instructor (4½ hours)</p>
TAUT 2000	<p>50 students 50 standard typewriters 25 TAUT trainers (in separate room)</p> <p>Method: one-half of class (25) trains on the devices for approximately 1 hour; practices on manual typewriters for 2 hours</p> <p>Instructors: 1 typing instructor (in class) 1 typing instructor (with TAUT) 1 academic instructor (4½ hours)</p>
Microprocessor	<p>50 students 50 standard typewriters 50 microprocessors (in separate room)</p> <p>Method: one-half of class (25) trains on the devices for approximately 1½ hours; practices on manual typewriters for 1½ hours</p> <p>Instructors: 1 typing instructor (in class) 1 typing instructor (with Micro) 1 academic instructor (4½ hours)</p>

Table 2. Treatment Formats for Advanced Students

Method/Treatment	Format
Standard--Large Group	50 students 50 standard typewriters Method: self-paced academic modules 1 hour manual practice per day Instructors: 1 typing instructor (2 hours) 1 academic instructor (5½ hours)
Standard--Small Group	25 students 25 standard typewriters Method: self-paced academic modules 1 hour manual practice per day Instructors: 1 typing instructor (2 hours) 1 academic instructor (5½ hours)
Microprocessor	50 students 50 standard typewriters 25 microprocessors (in separate room) Method: one-half of class (25) trains on the devices for approximately 45 minutes of typing period; on manual typewriters for remaining 45 minutes. Instructors: 1 typing instructor (with Micro) 1 academic instructor (in class)

In order to determine the equivalence of the four groups of students, entry level measures were obtained for educational level in grades completed, reading level in grade equivalents, and entry level typing skill in net words per minute. The mean values for each of the groups is presented in Table 3 on the following page. Analysis of variance procedures were employed in order to determine if the obtained differences between the four groups were statistically significant. The probability of statistical difference is listed for each of the entry level factors in the right-hand column of Table 3. The analysis of variance tables are presented in Tables A1, A2, and A3 at Appendix A-5. A probability level of .05, or less, was set in the test plan as the level at which the differences between the groups would be considered statistically greater than the differences within the groups. On this basis, it was determined that the four groups were not statistically different.

Table 3. Comparison of Mean Entry Level Variables  
for Basic Students

Entry Variables	Large Group		Small Group		TAUT 2000		Micro		p
	n	Mean	n	Mean	n	Mean	n	Mean	
Educational level (grade)	129	11.98	92	11.75	127	11.75	120	11.93	<.4338
Reading level (grade)	120	9.04	87	9.70	125	9.44	96	9.24	<.1334
Typing level (NWPM)	129	6.95	92	6.65	126	7.19	121	7.93	<.0917

#### Advanced Students

Three cycles of Advanced Classes were assigned on a first come, first served basis to the Standard--Large Group treatment. Of the 146 subjects assigned, four were dropped from this analysis for reasons similar to those stated above for basic student drops. Only two cycles of classes were assigned to the Standard--Small Group treatment. Of the 50 subjects assigned, 49 are included in this analysis. The relatively small sample size, in comparison to the other two treatments, causes reservations concerning any conclusions that might be drawn from the evaluation in regard to advanced students. Three cycles of the Micro treatment were completed, with 125 of the assigned 135 subjects included in this analysis.

Entry level measures of educational level, reading level, and entry typing skill were also taken for advanced students in order to determine the equivalency of the three treatment groups. The mean values obtained for each of the groups are presented in Table 4 on the following page. The probability of a significant difference between the three groups is presented in the right-hand column. The analysis of variance tables from which the probabilities were obtained are presented in Tables A4, A5, and A6 at Appendix A-6. The groups were found to be statistically different on two of the entry variables--educational level and entry level typing. Multiple range tests, applied to the differences between the groups, determined that the significance on educational level was caused by the gap between the Standard--Large Group and Standard--Small Group subjects. The Micro subjects were not significantly different from either of the other two groups on educational level. On entry level typing, the significance was caused by an approximate 8 NWPM gap between the Micro group and the other two groups. The Standard--Large Group and Standard--Small Groups were not significantly different. This obvious, as well as statistically significant, difference causes problems with interpretation of the results of this evaluation and raises doubts as to the conclusions which can be drawn from the test in regard to the Advanced Classes.

Table 4. Comparison of Mean Entry Level Variables  
for Advanced Students

Entry Variables	Large Group		Small Group		Micro		p
	n	Mean	n	Mean	n	Mean	
Educational level (grade)	140	12.05	49	12.45	121	12.29	<.0403*
Reading level (grade)	92	9.91	44	10.43	82	9.92	<.2876
Typing level	142	21.65	32	20.00	125	28.39	<.0000*

\*statistically significant

## 2. DISCUSSION

### Conduct of Test

The field test was conducted from September of 1980 through February of 1982. The first cycles of basic and advanced students in the Standard--Large Group treatments were initiated in September of 1980. The first of the TAUT 2000 classes was initiated in October 1980. The data from this first class had to be discarded due to problems with the Super 8mm film courseware. This caused a fourth cycle of the TAUT 2000 classes which was not completed until July of 1981. The first cycle of the Micro treatment classes was initiated in June of 1981 and the final cycle of advanced students in the Micro treatment classes was initiated in October of 1981. All classes had completed basic instruction prior to December of 1981. However, because of the self-paced nature of the academic modules, the final student data sheets were not completed until February of 1982.

The test exhibited a number of problems due to the long time period and to the "real world" nature of the test environment. There was a high rate of change in personnel assigned to the test. For example, three different Data Collectors worked on the evaluation. Problems with procurement and delivery of the microprocessor system delayed the start of the Micro classes and caused an extension of the original time-line for the evaluation. Changes from self-paced to group-paced instruction during the time period of the test had a greater impact on the Micro treatment than on the other treatments because of the delay in starting the Micro classes. These problems are a part of the cost of doing an evaluation in a field setting rather than in a controlled, laboratory environment; however, they need to be watched for, and if possible prevented, in any further field evaluations.

As the data was received from the Data Collector at Fort Jackson, it was checked for accuracy against copies of the student's AIT Training Record



(Typing) and any necessary corrections made on the Student Data Form. Then the data was coded for entry into the computer and data entry cards were punched. The data was summarized and analyzed with the SPSS analysis package to determine the nature as well as the degree of significance of any differences which were identified. Data on instructor acceptance of the TAUT 2000 and Micro systems was obtained by the Evaluator by means of personal interviews at Fort Jackson. Data on equipment reliability was obtained from equipment logs maintained by the instructors at Fort Jackson. Data on system costs were obtained from the Director, Administration School, Fort Jackson for the Standard treatments; from Training Associates, Standardsville, Virginia, for the TAUT 2000 system; and from Kee, Inc., Seminole, Florida, for the Micro system.

To help determine the equivalency of treatments between the four basic treatments and three advanced treatments, the average number of days absent was determined for each of the treatments at the different levels. The mean number of days absent for each is presented in Table 5 below. Analysis of variance, shown in the right-hand column, indicates that the differences were significant for the basic students but not for the advanced students (see ANOVA Tables A7 and A8 at Appendix A-7). Multiple range tests indicate that the significance was caused by the Micro students having a significantly larger number of days absent than the other treatments. This might be considered a reflection of attitude or motivation due to the treatment; however, it appears to have been caused by both a longer period of training and a few students who were AWOL for several days prior to being dropped from the course.

Table 5. Comparison of Mean Days Absent

Student Level	Large Group	Small Group	TAUT 2000	Micro	p
Basic	6.26	5.83	5.65	8.22	<.0009*
Advanced	4.75	4.31	NA	5.13	<.3917

\*statistically significant

Numerous problems were encountered in the collection of the data due to the self-paced nature of the MOS 71L10 course which produced staggered graduation dates and, therefore, a number of missing data entries, particularly in the later days of the training period. These problems will be covered in more detail under the discussion of findings.

## Findings

Because of the operational nature of this test and evaluation, the findings of the evaluation present a mixed picture and, depending on the weight placed on the various measures, a variety of conclusions can be derived from the results. The measures obtained from the evaluation can be placed in four major categories--measures of effectiveness, measures of efficiency, measures of acceptance, and measures of cost--and will be discussed in detail under each of these headings.

### Measures of Effectiveness

Effectiveness measures are those measures which relate to the overall levels of skill developed by students. Measures which relate to effectiveness that were obtained during the evaluation include High Score Obtained (the highest score on timed writing tests achieved by each student during any point of the training period), End-of-Course Test Score, and Graduation Rate (the percent of students reaching graduation, dropped for typing, etc., for each of the four treatments) for both the basic and advanced students.

The mean High Score in NWPM obtained by both basic and advanced students under each of the treatments examined in the evaluation is presented in Table 6 below. Analysis of variance, results are presented in Tables A9 and A10 at Appendix A-7 and A-8, determined that there was no statistical difference between the four treatments for the basic students. There was a highly significant difference for the advanced students, with multiple range tests showing that the Micro treatment was significantly higher than either Large Group or Small Group treatments. There was no difference statistically between either of the Standard treatments. The difference between the advanced treatment groups is approximately the same as, and is probably due to, the initial difference between the groups at entry into training.

Table 6. Comparison of Mean High Score in NWPM

Student Level	Large Group	Small Group	TAUT 2000	Micro	p
Basic	28.60	27.83	28.89	27.78	<.5831
Advanced	37.48	34.92	NA	42.26	<.0000*

\*statistically significant

The mean End-of-Course Test scores in NWPM for both the basic and the advanced students under each of the treatments examined in the evaluation is presented in Table 7 on the following page. Analysis of variance, presented in Tables A11 and A12 at Appendix A-8, indicates that the differences between the groups are statistically significant for both the basic and advanced students. Multiple range tests indicate that the significance on the basic

students is due to the difference between the Small Group and both the TAUT 2000 and Micro treatments--the Small Group score being significantly lower. There is no difference statistically between the Large Group score and the scores of any of the other treatments. The lower score for the Small Group appears to be due to the fact that students spent considerably less time (26.5 days) in the course under the Small Group treatment than did either the TAUT 2000 (32.3 days) or the Micro (30.6 days) students. For the Advanced students, multiple range tests indicate that the significance is caused by the higher score for students in the Micro treatment. There is no significant difference between Large and Small Group students. The gap appears to be due to two factors--the initial gap between the groups at the point of entry (approximately 8 NWPM) and the longer period in training (23.2 days as opposed to 16.1 and 16.7 days). In fact, the gap between the Micro and other groups is less on the End-of-Course test than it was at entry.

Table 7. Comparison of Mean End-of-Course Test Scores in NWPM

Student Level	Large Group	Small Group	TAUT 2000	Micro	p
Basic	29.31	28.39	30.08	29.60	<.0327*
Advanced	34.12	32.29	NA	38.99	<.0000*

\*statistically significant

An analysis of the reasons for basic students leaving the course is presented in Table 8 on the following page. Students who left the course for non-academic reasons, recalled to unit, discharged, etc., were not included in the population for the test. An application of Chi Square frequency analysis techniques indicates that the differences between the treatments are significant at the <.0491 level of probability. The statistical significance appears to be due to (1) the high percentage of students graduating under the Small Group treatment, (2) the higher than expected number of academic drops under the Micro treatment, and (3) the low number of academic drops combined with a higher than expected number of combined academic/typing drops under the Large Group treatment. No evidence was gathered to address the reasons for academic drops.

A comparison of the mean NWPM achieved by students at the time they were dropped from the course due to either typing or a combination of academic and typing performance and of the mean number of days completed by such students is presented in Table 9 on the following page. The considerably longer period of time that students were allowed to remain in the course under the Micro treatment before they were dropped due to poor typing may have been responsible for the poor performance of the Micro students in the Rate of Skill Attainment comparison which is discussed at a later point in this report.

Table 8. Comparison of Course Completions and Attrition  
for Basic Students

Completion/Attrition	Large Group		Small Group		TAUT 2000		Micro	
	n	%	n	%	n	%	n	%
Graduation	81	62.8	68	73.9	76	60.4	75	61.5
DROP: Academic	8	6.2	8	8.8	17	13.5	18	14.8
DROP: Academic/Typing	21	16.3	5	5.4	11	8.7	9	7.4
DROP: Typing	6	4.6	7	7.6	9	7.1	12	9.8
DROP: Attitude/ Motivation	13	10.1	4	4.3	13	10.3	8	6.5
TOTAL	129	100.0	92	100.0	126	100.0	122	100.0

Table 9. Comparison of NWPM and Training Days for Typing Drops  
of Basic Students

Large Group			Small Group			TAUT 2000			Micro		
n	NWPM	Days	n	NWPM	Days	n	NWPM	Days	n	NWPM	Days
26	16.8	26.85	7	16.0	28.14	25	13.8	27.12	21	17.5	34.38

The graduation rate for the advanced students is presented in Table 10 on the following page. The differences between the three advanced groups were also found to be statistically significant at the  $<.0405$  level of probability through the use of Chi Square analysis. In the case of the advanced students, the significance appears to be due to the number of academic drops under the Micro treatment compared to the other treatments.

#### Measures of Efficiency

Efficiency measures are those measures which relate to the speed at which different levels of skill are obtained. Measures which relate to the efficiency of the different methods being evaluated in this report include, for the basic students, Days to Reach 15 NWPM, Days to Reach 25 NWPM, Days to Move from 15 to 25 NWPM, Day of High Score, and Total Training Days, as well as Rate of Skill Acquisition which is treated in this report as a separate item and will be discussed in the following section. The same measures, with the addition of Days to Move from 15 to 35 NWPM and Days to Move from 15 to 45 NWPM, were taken for the advanced students.

Table 10. Comparison of Course Completions and Attrition  
for Advanced Students

Completion/Attrition	Large Group		Small Group		Micro	
	n	%	n	%	n	%
Graduation	134	95.7	46	93.9	115	92.0
DROP: Academic	5	3.6	1	2.0	10	8.0
DROP: Attitude/Motivation	1	.7	2	4.1	0	.0
TOTAL	140	100.0	49	100.0	125	100.0

The mean values for efficiency measures obtained for basic students under each of the four treatments evaluated in the test are presented in Table 11 below. Only two of the measures were found to be statistically different when analysis of variance techniques were applied--Day of High Score and Total Training Days. The probabilities obtained from the analysis of variance, taken from Tables A13 through A17 at Appendix A-9 and A-10, are listed in the right-hand column. The two statistically significant differences appear to be interrelated. Typing speed is largely a factor of practice after the basic keyboard has been mastered. The longer the student practices, the higher the NWPM obtained. Since students spent significantly less time in training, as

Table 11. Comparison of Mean Efficiency Measures  
for Basic Students

Measure	Large Group		Small Group		TAUT 2000		Micro		p
	n	Mean	n	Mean	n	Mean	n	Mean	
Days to Reach 15 NWPM	124	8.72	82	9.85	113	8.95	115	10.13	.1736
Days to Reach 25 NWPM	105	18.27	73	19.13	96	17.85	91	20.34	.3834
Days from 15 to 25 NWPM	105	9.88	73	9.49	96	9.32	91	11.01	.5093
Day of High Score	129	24.67	89	23.56	127	27.56	122	26.85	.0158*
Total Training Days	129	29.51	88	26.45	127	32.31	122	30.55	.0006*

\*statistically significant

determined by multiple range tests, under the Small Group treatment than under any of the other three treatments (there was no statistical difference between the Large Group, TAUT 2000, and Micro treatments on total training days) the date of their high score would come earlier in the training period. This was found to be the case, the significant difference on Day of High Score being primarily due to the gap between the Small Group and TAUT 2000 treatments. The findings in regard to total training days might have implications for the organization of the 71L10 course, since students seem to complete the course more rapidly if they are organized in smaller sections. However, there is no way to determine if this is a factor of the self-paced academic modules or of keyboard training.

The mean values for efficiency measures obtained for the advanced students under each of the three treatments evaluated in the test are presented in Table 12 below. As can be seen in the right-hand column, a number of the differences between the groups were found to be statistically significant through the use of analysis of variance techniques (see Tables A18 through A24 at Appendix A-10 to A-12). The statistical significance on Days to Reach 25 NNWPM and Days from 15 to 25 NNWPM reflects the entry level typing skills of the students under the Micro treatment rather than any inherent characteristics of the Micro system. When entry level scores have a mean value of 28.39 NWPM, it would be surprising if they did not score significantly better than the other groups on measures dealing with 25 NNWPM. The other statistically significant differences, Day of High Score and Total Training Days, also seem to reflect something other than characteristics of the training systems being evaluated. As with the basic students, the date of the high score reflects practice time. If more time is spent in practice, a higher score will be obtained at a later point in the training period. Since the Micro students, due to group-pacing, put in approximately seven more days

Table 12. Comparison of Mean Efficiency Measures  
for Advanced Students

Measure	Large Group		Small Group		Micro		p
	n	Mean	n	Mean	n	Mean	
Days to Reach 15 NWPM	142	1.08	49	1.14	125	1.09	.6003
Days to Reach 25 NWPM	140	3.19	49	4.67	124	2.31	.0002*
Days from 15 to 25 NWPM	140	2.11	49	3.52	124	1.23	.0002*
Days from 15 to 35 NWPM	85	5.85	24	6.13	99	5.94	.9813
Days from 15 to 45 NWPM	24	6.62	4	7.25	44	7.20	.9430
Day of High Score	141	12.48	49	12.94	125	17.09	.0000*
Total Training Days	141	16.09	49	15.69	125	23.19	.0000*

\*statistically significant

in training, their Day of High Score was significantly later. The Total Training Days appears to be due to the fact that students were held in the class longer after they had reached graduation typing levels than in the other two treatments, reflecting a change from self-paced to group-paced instruction within the 71L10 course.

#### Rate of Skill Acquisition

The self-paced nature of the AIT produced a major problem in the comparison of the rates of skill acquisition for the various treatments under consideration in the test. As students completed and graduated from the course, empty data cells were created in the analysis. For example, the average NWPM on training day 40 would be based on 27.7 percent of the TAUT 2000 students while only 6.48 percent of the Small Group students would be left to form the average for the Small Group treatment (see Table 13 on the following page). Learning curves derived from such averages would not reflect the effects of the training methods as much as it would reflect the different rates of student attrition under the various treatments. For example, a preliminary analysis (see Figure A1 at Appendix A-13) showed little or no gain in NWPM for students in the Small Group treatment between the 30th and 40th days of the training, in spite of 10 additional days of practice, while the other treatments showed a steady gain of skill acquisition over the same training period. An examination of the attrition rates for the various treatments indicated that the problem was due to the fact that students were reaching graduation sooner under the Small Group treatment and therefore the higher student scores were being removed from the averages.

In order to compare the treatments, it was necessary to develop a method of compensation for missing data. This was done by determining the average gain from one test date to the following test date for all students under each of the treatments who were tested on both dates. This gain score was determined separately for each of the four basic student treatments and each of the three advanced student treatments. The appropriate gain score was then added to the preceding test score to determine a predicted test score for each case of missing data. The adjusted mean NWPM derived by means of this procedure for basic students under each of the four treatments is presented in Table 13. Analysis of variance techniques were applied to the adjusted scores to determine if the differences between the groups were greater than the differences within the groups. The probability values obtained from the analysis of variance are listed in the right-hand column of Table 13. The differences between the groups were found to be statistically significant only on training day 35, with the Small Group treatment being significantly better than the other three treatments at the  $<.0053$  level of probability. Multiple range tests indicated that there was also a significant gap between the Small Group treatment and the other treatments on the 30th and 40th training days; however, it was not of sufficient degree to make the total analysis of variance statistically significant.

In order to graphically compare the rates of skill acquisition, learning curves for each of the four treatments were developed on the basis of the adjusted mean NWPM obtained on each of the training days on which typing scores were recorded. The learning curves for the basic students are presented in Figure 1 on page 16. The learning curves for each of the four treatments exhibit the same basic pattern. There was a rapid increase in NWPM

Table 13. Adjusted Mean NWPM and Attrition of Basic Students Over Time

Day of Testing	Standard-- Large Group			Standard-- Small Group			TAUT 2000			Microprocessor			p
	NWPM	n	%	NWPM	n	%	NWPM	n	%	NWPM	n	%	
Entry	6.9	129	100.0	6.7	92	100.0	7.2	127	100.0	7.9	121	100.0	<.0917
Day 8	16.5	129	100.0	17.5	89	96.1	16.9	127	100.0	15.8	121	100.0	<.3420
Day 10	17.7	127	98.4	18.4	89	96.1	18.2	127	100.0	16.9	120	99.1	<.3598
Day 12	18.0	125	96.9	19.0	89	96.1	18.5	127	100.0	18.2	116	95.8	<.7311
Day 14	19.6	124	96.1	19.3	88	95.0	18.3	123	97.2	18.3	112	92.5	<.3389
Day 16	20.5	121	93.8	19.3	85	91.8	19.6	121	95.6	19.7	108	89.2	<.6730
Day 18	21.5	114	88.4	20.4	78	84.2	20.6	113	89.3	20.6	100	82.6	<.6610
Day 20	21.8	106	82.2	22.5	68	73.4	21.6	105	83.0	21.4	98	80.9	<.8894
Day 25	24.5	87	67.4	24.1	55	59.4	23.3	90	71.1	23.1	88	72.7	<.4124
Day 30	25.0	63	48.8	27.2	35	37.8	25.3	77	76.3	25.2	68	56.2	<.1064
Day 35	26.8	38	29.5	30.1	16	17.3	27.4	56	44.2	27.5	41	33.9	<.0053*
Day 40	30.1	24	18.6	32.1	6	6.48	30.3	35	27.7	29.5	26	21.5	<.0607

\*statistically significant



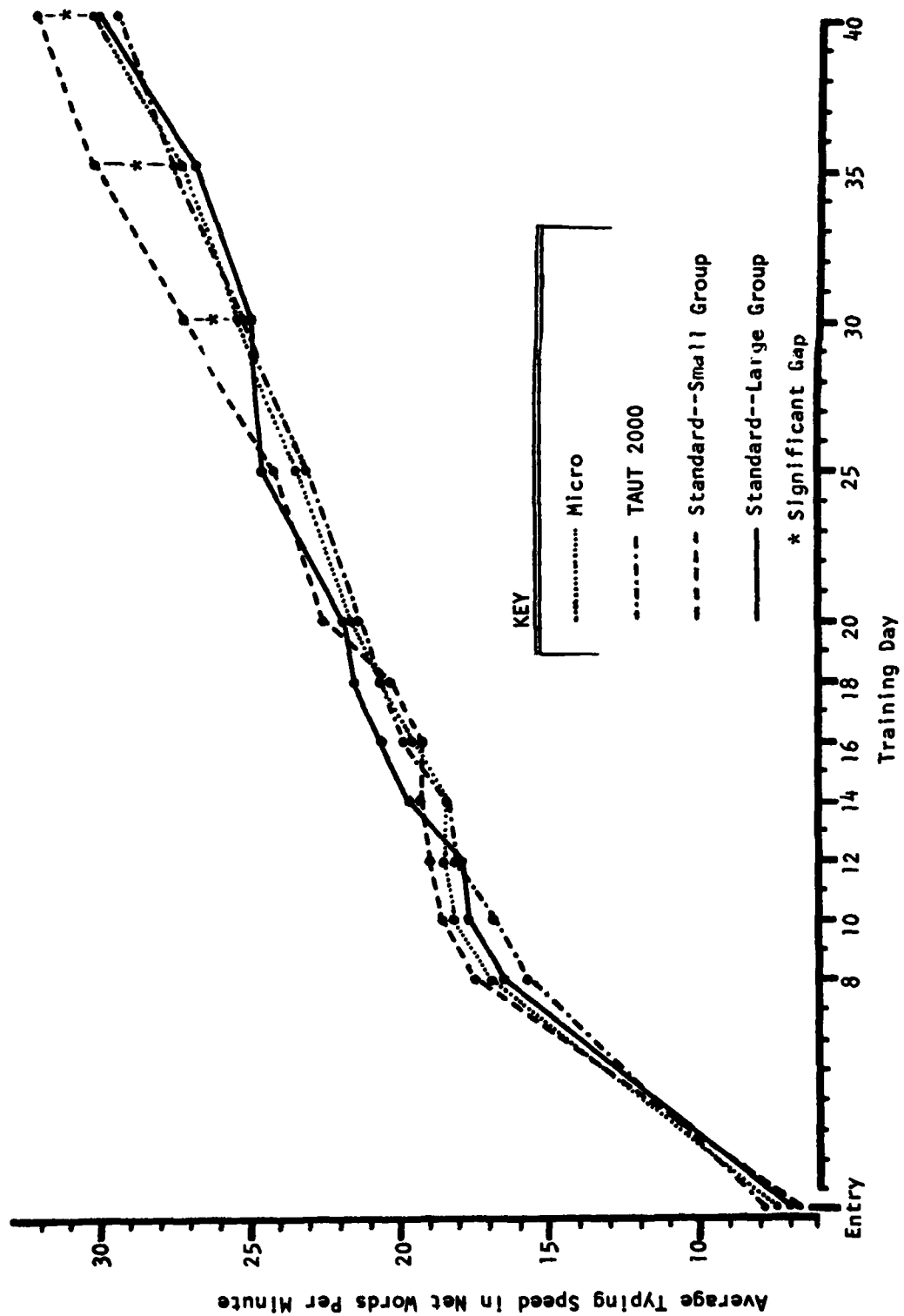


Figure 1. Comparison of Learning Curves for Basic Students

over the first two weeks of the training period, followed by a dip in the curve between training days 12 and 16, followed by a slow but steady increase in typing speed during the remaining training period. The dip in skill acquisition between the 12th and 16th day of training corresponds to the point at which students reach the necessary NWPM to convert from hand written to typed assignments on the academic modules and, therefore, represents a period of adjustment to the demands of production typing.

The mean NWPM obtained for the advanced students on each of the testing days was adjusted in the same manner as the scores obtained for the basic students. The adjusted mean NWPM and the student attrition over time under each of the three advanced student treatments is presented in Table 14 below. The differences in student attrition are even more marked in the advanced classes than they were in the basic classes. On the 20th day of training 91.2 percent of the Micro treatment students were still in training while only 22 percent of the students in the other two treatment groups were still in the class. This is because the Micro students were held back from graduation until they had completed the Micro instructional units. On the 30th and 35th days of training there were not enough students left in the classes to even project a mean NWPM. The probability of statistical difference

Table 14. Adjusted Mean NWPM and Attrition of Advanced Students Over Time

Day of Testing	Standard-- Large Group			Standard-- Small Group			Microprocessor			p
	NWPM	n	%	NWPM	n	%	NWPM	n	%	
Entry	21.7	142	100.0	20.0	49	100.0	28.4	125	100.0	<.0000*
Day 1	25.2	142	100.0	22.7	49	100.0	28.3	125	100.0	<.0003*
Day 4	28.8	142	100.0	27.8	49	100.0	31.6	125	100.0	<.0087*
Day 7	31.2	141	99.3	28.1	49	100.0	32.9	125	100.0	<.0053*
Day 10	32.0	131	93.0	30.7	49	100.0	34.5	123	98.4	<.0118*
Day 13	32.4	114	80.9	31.0	41	83.6	35.0	121	96.8	<.0105*
Day 16	34.6	76	54.0	31.2	23	46.9	35.6	121	96.8	<.0093*
Day 20	34.7	39	22.0	34.2	11	22.4	36.1	114	91.2	<.3153
Day 25	37.7	10	7.1	37.2	5	10.2	38.0	54	43.2	<.8376
Day 30	----	1	.7	----	0	.0	39.0	10	8.0	----
Day 35	----	0	.0	----	0	.0	----	0	.0	----

\*statistically significant

between the adjusted mean NWPM for each of the groups at each testing point, as determined by analysis of variance, is listed in the right-hand column of Table 14. In most cases, the statistically significant differences can be attributed to the initially higher NWPM of the Micro students at entry into AIT, rather than to any differences between the treatments.

The learning curves that were developed under each of the three treatments of advanced students are presented graphically in Figure 2 below. The statistically significant gaps between the three treatments appear to reflect the initial difference between the groups (training days 1, 4, 10, and 16). The significant gaps between the Large Group and Small Group treatments on the 7th and 16th training days appear to be primarily due to day-to-day fluctuations in student performance rather than to a steady trend. The trend for all of the treatments, with the advanced students, is a slow and steady improvement in NWPM converging on a common level of production.

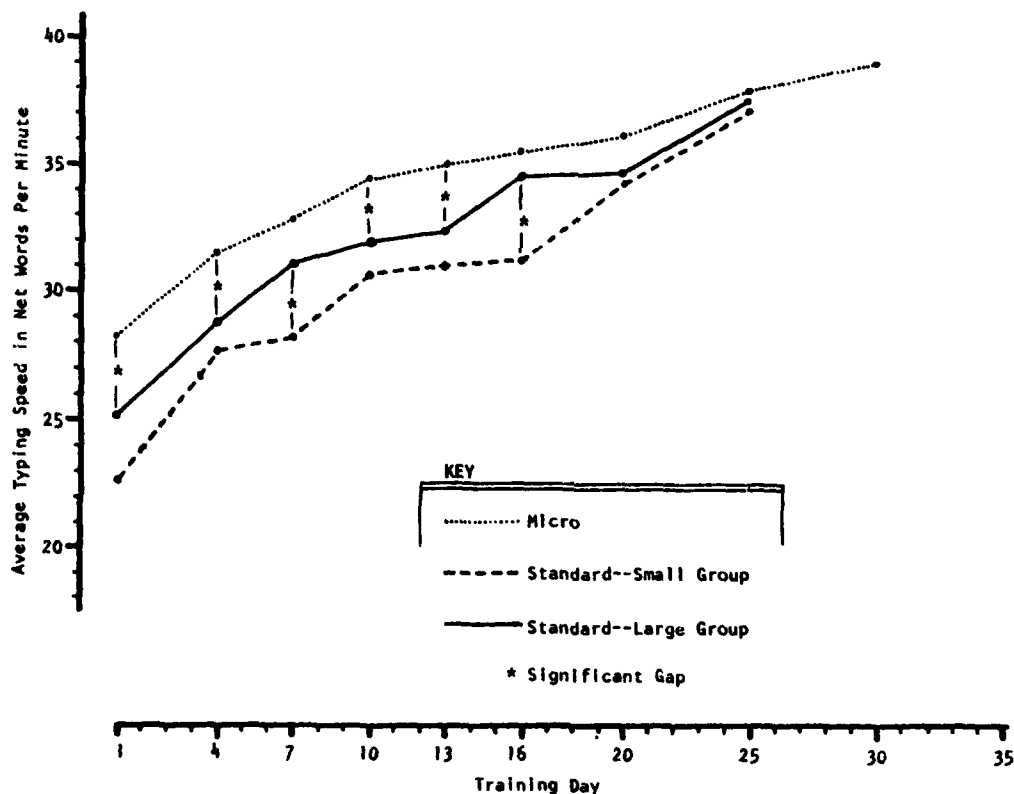


Figure 2. Comparison of Learning Curves for Advanced Students

### Effect of Reading Level

In order to determine if the student's reading ability affected the student's performance, Pearson product-moment procedures were employed to determine the degree and significance of any correlation between either the number of days needed to reach the 25 NWPM required for graduation or the End-of-Course Test score. The correlations (r values) obtained for the basic students--total population and for each of the four treatments--are presented in Table 15 below. The obtained correlations for the advanced student treatments are presented in Table 16 below.

Table 15. Correlation of Mean Reading Level with Mean Days to 25 NWPM and Mean End-of-Course Test Score for Basic Students

Factor Considered	Large Group	Small Group	TAUT 2000	Micro	Total
Days to Reach 25 NWPM: r =	-.0650	-.2194	-.1062	-.2904	-.1330
p =	<.525	<.066	<.306	<.016*	<.015*
End-of-Course Test Score: r =	-.1008	.0923	-.0666	-.1415	.0223
p =	<.399	<.745	<.567	<.298	<.716

\*statistically significant

Table 16. Correlation of Mean Reading Level with Mean Days to 25 NWPM and Mean End-of-Course Test Score for Advanced Students

Factor Considered	Large Group	Small Group	Micro	Total
Days to Reach 25 NWPM: r =	-.1821	-.1433	-.2433	-.0009
p =	<.084	<.353	<.029*	<.990
End-of-Course Test Score: r =	-.0677	.0072	.0906	-.0065
p =	<.545	<.964	<.449	<.928

\*statistically significant

For both the basic and the advanced students, there was a slightly negative correlation between reading level and days to reach 25 NWPM--the higher the reading level, the less time required to reach 25 NWPM. The probability that this correlation was not zero was statistically significant

for the total population of basic students and for the students in the Micro treatment at both the basic and advanced levels. However, the degree of correlation found was so slight for each of these groups that it appears to have had little or no effect on the results of this test. Reading level would account for only 2% of the variance within the basic student population. Within the Micro treatment, reading level accounted for 8% of the variance for basic students and 7% for advanced students. The higher correlation for the Micro treatment than for the other treatments does, however, indicate that reading might be associated with student performance under the Micro treatment.

#### Measures of Cost and Reliability

A comparison of the cost estimates for three of the treatments--Standard, TAUT 2000, and Micro--is presented in Table 17 on the following page. The equipment and staff needs for each of the treatments is based on the format descriptions provided in the section on evaluation design.

All equipment and system set-up costs are based on figures reported by the appropriate distributor or by the Administration School, Fort Jackson. In order to allocate set-up costs on a per class basis, equipment is depreciated over an eight year period. Assuming that 12 classes per year would make use of the typewriters, the typewriter cost would be divided by 96 ( $12 \times 8$ ) to determine the per class cost. The electronic instructional equipment could be used by four classes each day, so the cost of such equipment would be divided by 192 (6 sessions  $\times$  4 classes  $\times$  8 years) to obtain the per class costs. The TAUT 2000 system lists 27 rather than the 25 minimal number of devices in order to provide back-up for equipment problems which were encountered in the test. If the microprocessor system were used for other purposes in addition to basic keyboard instruction, such as the delivery of academic modules, the cost figures upon which the comparisons are based would be changed due to a reduction in the portion of the initial cost that would be depreciated against the keyboard instruction component of the course.

An instructor (both typing and academic) is paid approximately \$20,000 per year. Assuming that the instructor would be assigned to 10 classes during a year, the salary charge for a regular instructor against a class would be \$2,000. Instructors working in the TAUT 2000 and Micro rooms could handle four classes a day, so the charge against each class would be \$500.00.

Student support (housing, food, allowances, etc.) is based on a figure of \$400.00 per student per month, or approximately \$20.00 per student per day of training. Student cost is variable between the three treatments because of the differences in time required for students to complete the self-paced academic modules. Cost estimates for student support in Table 17 is based on the average total training days as listed on page 12 of this report for each of the three treatments.

In order to determine the reliability of the equipment under field test conditions, maintenance records were maintained by the instructors. The Micro treatments recorded no down time due to equipment failure. This compares favorably to the distributor's report that of 112 units that he has out in the field, only 8 have had to be brought in for repair during the past one and a half years. Over 90% of the Micro maintenance problems can be

Table 17. Cost Comparisons for Three Treatments

System	Set-up Costs		Per Class Costs		Total
	Item	Cost	Item	Cost	
STANDARD	50 Standard Typewriters @ \$224.00.....	\$11,200.00		566.00	
			Materials.....	75.00	
			Typing instructor.....	2,000.00	
			Academic instructor.....	2,000.00	
			Student support..... (29.51 days)	29,510.00	34,151.00...
TAUT 2000	27 TAUT 2000 Trainers @ \$2,500.00.....	67,500.00		352.00	
	50 Standard Typewriters.....		Materials.....	566.00	
			Typing instructor.....	75.00	
			Academic instructor.....	2,000.00	
			TAUT 2000 Instructor..... Student support..... (32.31 days)	2,000.00 500.00 32,310.00	37,803.00... 37,803.00
MICRO	25 MCT-100 Microprocessor Systems @ \$5,848.25.....	146,206.25			
	Printer.....	1,251.00			
	Installation/Cabling.....	600.00			
		148,057.25		771.00	
	50 Standard Typewriters.....		Materials.....	566.00	
			Typing instructor.....	75.00	
			Academic instructor.....	2,000.00	
			Micro instructor.....	2,000.00	
			Student support..... (30.55 days)	500.00 30,550.00	36,462.00... 36,462.00

repaired by a low level electronic technician. The TAUT 2000 system had considerably more reliability problems. This was in large part due to the decision to adapt the TAUT 2000 keyboard to existing Beseler Cue See devices that the Army had on hand. In many cases the existing Beselers were 10 to 12 years old and not the model for which the keyboard had been developed. As a result, the Beselers needed constant attention and adjustment in order to maintain calibration of the control mirrors. For example, of the 150 breakdowns recorded for the first class to use the TAUT 2000 system, all but four were for the adjustment of the mirrors. These problems were, to a large part, cleared up for the three classes that were included in the test. The second class to use the TAUT 2000 system averaged under one breakdown per day and half of these were for burned out light bulbs. The distributor for the TAUT 2000 indicates that over 95% of the problems encountered in the test could have been eliminated by use of machines that had been calibrated in the factory prior to delivery. However, this would not take advantage of the existing Beseler Cue See units in the Army inventory.

#### Measures of Acceptance

Interviews were conducted, using an attitudinal survey instrument, with the four typing instructors who worked with the TAUT 2000 system and with the three basic and three advanced instructors who worked with the Micro system. This sample was too small to do valid statistical analysis; however, the instructors' responses in regard to each of the two electronic-based treatments are summarized in Table 18 on the following page.

In general, the instructors were positive about such factors of the electronic-based systems as the physical arrangement, ease of repair, operation of the equipment, and attitude of students. They were generally negative, however, to such factors as the ease of adjusting to using both the device and the standard typewriter, the degree of interaction between students and instructors, and equality of benefit for students, leading them to be strongly negative to the idea of general adoption of either system by the Army for basic keyboard instruction.

The instructors' criticisms of the TAUT 2000 system focused on problems with transfer to the manual typewriter (e.g., no shift key, no upper and lower case), physical problems with machine calibration and program organization, and the development of poor typing practices (e.g., viewing the screen rather than the text).

The Micro system instructors felt that the best use for the system would be for remedial instruction and review of basic keyboard skills rather than for general instruction. A number of instructors commented on the negative effect on student attitude toward instructors. As with the TAUT 2000 system, instructors noted a number of differences between the Micro system and the standard keyboard that created problems when students transferred to the manual system.

Students on the TAUT 2000 and Micro systems completed an attitudinal survey upon leaving the course. Without data on the Standard treatment with which to make comparisons, it is not possible to draw any general conclusions or recommendations from student attitudes. It is possible, however, to make a comparison of student reactions to the two electronic-based treatments. The

Table 18. Summary of Instructor Reactions  
to TAUT 2000 and Micro Systems

Question	TAUT 2000	Micro	
		Basic	Advanced
Did use of this device encourage interaction between students and instructors?	mixed	mixed	NEGATIVE
Did use of the device assist the instructor in the teaching process?	POSITIVE	POSITIVE	mixed
Was instructor training in the use of the device adequate?	POSITIVE	mixed	POSITIVE
Was the physical arrangement of the room and equipment satisfactory?	POSITIVE	POSITIVE	POSITIVE
Did the students easily adjust to using the device and the standard typewriter at the same time?	NEGATIVE	NEGATIVE	POSITIVE
Was the operation of the device simple and easily understood?	POSITIVE	POSITIVE	POSITIVE
Were repairs easy to arrange for and promptly received?	mixed	POSITIVE	POSITIVE
Was the device mechanically reliable?	NEGATIVE	POSITIVE	mixed
Did you enjoy having the device available?	POSITIVE	mixed	NEGATIVE
Was the program well written; that is did it teach keyboard skill effectively?	POSITIVE	mixed	POSITIVE
Were the systems generally problem-free for students?	mixed	mixed	POSITIVE
Did the students show or express approval, positive interest or enjoyment regarding use of the system?	POSITIVE	POSITIVE	mixed
In your view, did the students benefit from the use of the system?	mixed	mixed	mixed
Did all students benefit equally from using the system?	NEGATIVE	NEGATIVE	NEGATIVE
Do you believe the system is worth adopting for use in Army typing classes?	NEGATIVE	mixed	NEGATIVE



student attitudinal responses are summarized in Table 19 below. For questions one through nine, student responses had a possible range of from 1.0 to 4.0. For these items, the closer to a mean value of 1.0, the more positive the students' response to the item. For question 10 and 11, the range was from 1.0 to 2.0. Analysis of variance was applied to the student responses to determine if there were any statistically significant differences between the means obtained for the groups on any of the items. The probabilities of statistical difference from this analysis are listed in the right-hand column of Table 19.

Table 19. Summary of Mean Student Reactions  
to TAUT 2000 and Micro Systems

Question	TAUT 2000	Micro	p
1. Were the physical arrangements comfortable?	1.43	1.45	<.7664
2. Did you enjoy using the machine?	1.45	1.43	<.8569
3. Were the directions given by the machine easy to understand?	1.11	1.10	<.8839
4. Did you have trouble moving from the machine to the manual typewriter?	1.95	1.86	<.4002
5. Did the machine break down while you were using it?	2.04	1.08	<.0000*
6. Did the viewing screen bother your eyes?	1.68	1.20	<.0000*
7. Did you receive help from the instructor?	1.93	1.56	<.0011*
8. Did you need more help than you received?	1.38	1.30	<.3812
9. Did your outside duties interfere with class?	2.11	2.19	<.2014
10. Have you ever used a machine like this before, for any reason?	1.93	1.88	<.2334
11. Would you recommend this machine for use in all typing classes?	1.21	1.09	<.0154*

\*statistically significant

In general, students were favorable to both of the devices. Their most negative reactions were to breakdown problems with the TAUT 2000 system and to problems with transfer to the manual typewriter under both systems. Students under the Micro treatment were more in favor of its adoption, at a statistically significant level, than were the TAUT 2000 students. Students with the TAUT 2000 system had more problems with the viewing screen and

machine breakdown, at a significant level, and did not feel they were getting as much instructor help as the Micro students.

### 3. CONCLUSIONS AND RECOMMENDATIONS

In reviewing the results of this test, it is important to keep in mind that the test was not a controlled experiment. All efforts were made to maintain the normal operational procedures of the Administration School. As a result, a number of problems were encountered in the test due to the real world nature of the test environment. Also, the distinction between the statistical significance and the practical importance of any reported differences must be kept clear when interpreting the results reported in this evaluation. With the large number of subjects examined in the test, it is relatively easy to find statistical differences between groups. For example, on the comparison of the End-of-Course test scores for the four basic student treatments, a range of 1.69 NWPM from the high to the low mean scores for the different treatments was statistically significant at the  $<.0327$  level of probability. Such a small degree of difference is of relatively low importance in selecting the mode of training to be employed.

On the basis of the evidence presented in this paper it is possible to make the statement that each of the systems examined is capable of developing the basic keyboard typing skills of the students. However, it is not possible to say that any one system is the "better" system in all cases.

In regard to measures of effectiveness, End-of-Course test scores indicate that the Small Group treatment is better than either of the two electronic-based systems, but it is not better than the Large Group treatment for the basic students. Once differences in entry levels are accounted for, there is no difference between the groups at the advanced level.

On measures of efficiency, once differences in training time are allowed for, there is no difference between the groups. There is a slight gain in training time from reduction of class size, but the cost savings from reduced student time in training would be more than offset by the increase in costs for instructors and facilities.

On measures of cost, both of the electronic systems represent added cost since they are in addition to, and do not represent a displacement of, the cost of the current system.

On measures of acceptance, the instructors were negative toward the new systems, but the strongly positive responses of the students would more than counter such reactions.

Since the current system of typing instruction appears to be working as well as any of the alternatives evaluated in this test, the recommendation of this report is that none of the experimental treatments be adopted for wide use at the Administration School, Fort Jackson, at this time, and that the current system of typing training be maintained.

The major recommendation from this test and evaluation does not preclude further experimentation or testing of electronic-based delivery systems for use in keyboard training. The recommendation is for the present time only, and is based on the two specific systems examined in this test. It may well be that other systems, employing variations of the tested delivery formats, might well produce educationally important as well as statistically significant differences. If the keyboard of the instructional devices had been modified to have the same pitch and stroking characteristics as the manual keyboards employed in testing, or if the testing had been carried out on an electronic keyboard, the results of the evaluation might well have been different. Also, the recommendation is in the context of the Administration School. If training were to move toward a totally self-instructional format, outside of the formal school setting, the results of this evaluation could be used in support of either of the electronic-based systems as an independent means of developing basic keyboard skills at duty stations since there was no difference between the experimental and standard systems in regard to effectiveness or efficiency of skill acquisition.

## 1. I.D. NO. \_\_\_\_\_

2. DATE ASSIGNED \_\_\_\_\_

3. BASIC ADVANCED

INSTRUCTOR

4. NAME \_\_\_\_\_ SSAN \_\_\_\_\_  
Last First MI

5. UNIT \_\_\_\_\_ GRADE \_\_\_\_\_

6. EDUCATION LEVEL (Circle year completed): 8 9 10 11 12 (H.S.); 13 14 15 16 (College)  
Service School(s)

7. READING SCORE \_\_\_\_\_ NAME OF TEST \_\_\_\_\_

8. ENTRY TYPING TEST SCORE: Gross \_\_\_\_\_ Errors \_\_\_\_\_ NET WPM \_\_\_\_\_

9. TYPING TEST RECORD:

**A. BASIC STUDENT:**

# Manual Typewriter

## Training System

Training Day	_____	(NWPM)	_____
Training Day 8	_____		_____
Training Day 10	_____		_____
Training Day 12	_____		_____
Training Day 14	_____		_____
Training Day 16	_____		_____
Training Day 18	_____		_____
Training Day 20	_____		_____
Training Day 25	_____		_____
Training Day 30	_____		_____
Training Day 35	_____		_____
Training Day 40	_____		_____

**B. ADVANCED STUDENT:**

Training Day 1		
Training Day 4		
Training Day 7		
Training Day 10		
Training Day 13		
Training Day 16		
Training Day 20		
25	30	35

C. ALL STUDENTS: Training Day on which following NWPM Attained:

15 NWPM \_\_\_\_\_ 25 NWPM \_\_\_\_\_ 30 NWPM \_\_\_\_\_ 35 NWPM \_\_\_\_\_ 40 NWPM \_\_\_\_\_  
45 NWPM \_\_\_\_\_ 50 NWPM \_\_\_\_\_ 55 NWPM \_\_\_\_\_ 60 NWPM \_\_\_\_\_ High Score \_\_\_\_\_.

10. END-OF-COURSE TESTING SCORE \_\_\_\_\_. 11. DATE OF GRADUATION \_\_\_\_\_.

12. DAYS PRESENT IN CLASS \_\_\_\_\_. 13. DAYS ABSENT FROM CLASS \_\_\_\_\_.

14. REASON FOR LEAVING CLASS: Graduation \_\_\_\_\_. Other (state) \_\_\_\_\_  
Reassignment \_\_\_\_\_. Location \_\_\_\_\_

STUDENT OPINION FORM: Reverse of Student Data Form

1. Were the physical arrangements comfortable?  
\_\_\_\_\_ Good \_\_\_\_\_ All Right \_\_\_\_\_ Poor \_\_\_\_\_ Uncomfortable  
Explain \_\_\_\_\_
2. Did you enjoy using the machine?  
\_\_\_\_\_ Very Much \_\_\_\_\_ Somewhat \_\_\_\_\_ Little \_\_\_\_\_ Not At All  
Why, or why not? \_\_\_\_\_
3. Were the directions given by the machine easy to understand?  
\_\_\_\_\_ Very Easy \_\_\_\_\_ All Right \_\_\_\_\_ Difficult \_\_\_\_\_ Impossible  
Explain the good or bad features \_\_\_\_\_
4. Did you have trouble moving from the machine to the manual typewriter?  
\_\_\_\_\_ No Trouble \_\_\_\_\_ Some \_\_\_\_\_ Much \_\_\_\_\_ Couldn't do it  
explain \_\_\_\_\_
5. Did the machine break down while you were using it?  
\_\_\_\_\_ Never \_\_\_\_\_ Sometimes \_\_\_\_\_ Often \_\_\_\_\_ Most of the Time  
What went wrong, if anything? \_\_\_\_\_
6. Did the viewing screen bother your eyes?  
\_\_\_\_\_ Never \_\_\_\_\_ Sometimes \_\_\_\_\_ Often \_\_\_\_\_ Always  
Explain \_\_\_\_\_
7. Did you receive help from the instructor?  
\_\_\_\_\_ Much \_\_\_\_\_ Some \_\_\_\_\_ Little \_\_\_\_\_ None  
What was helpful? \_\_\_\_\_
8. Did you need more help than you received?  
\_\_\_\_\_ Much \_\_\_\_\_ Some \_\_\_\_\_ Little \_\_\_\_\_ None  
Explain \_\_\_\_\_
9. Did your outside duties interfere with class?  
\_\_\_\_\_ Much \_\_\_\_\_ Some \_\_\_\_\_ Little \_\_\_\_\_ None  
Give examples \_\_\_\_\_
10. Have you ever used a machine like this before, for any reason? \_\_\_\_\_ YES \_\_\_\_\_ NO  
Explain \_\_\_\_\_
11. Would you recommend this machine for use in all typing classes? \_\_\_\_\_ YES \_\_\_\_\_ NO  
Why, or why not? \_\_\_\_\_
12. Explain in your own words: what are the good and bad points of this method of teaching typing? How could it be improved? \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

FORM B: INSTRUCTOR/STAFF INTERVIEW SCHEDULE

NAME \_\_\_\_\_ JOB TITLE (Role) \_\_\_\_\_

SYSTEM ASSESSED \_\_\_\_\_ CLASS STARTING DATE \_\_\_\_\_

1. Did use of this device encourage interaction between students and instructors? \_\_\_\_\_ YES \_\_\_\_\_ NO  
Explain \_\_\_\_\_
2. Did use of the device assist the instructor in the teaching process? \_\_\_\_\_ YES \_\_\_\_\_ NO  
In what way? \_\_\_\_\_
3. Was instructor training in the use of the device adequate? \_\_\_\_\_ YES \_\_\_\_\_ NO  
Comments \_\_\_\_\_
4. Was the physical arrangement of room and equipment satisfactory? \_\_\_\_\_ YES \_\_\_\_\_ NO  
Explain \_\_\_\_\_
5. Did the students easily adjust to using the device and the standard typewriter at the same time? \_\_\_\_\_ YES \_\_\_\_\_ NO  
Observations \_\_\_\_\_
6. Was the operation of the device simple and easily understood? \_\_\_\_\_ YES \_\_\_\_\_ NO  
Why, or why not? \_\_\_\_\_
7. Were repairs easy to arrange for and promptly received? \_\_\_\_\_ YES \_\_\_\_\_ NO  
Explain \_\_\_\_\_
8. Was the device mechanically reliable? \_\_\_\_\_ YES \_\_\_\_\_ NO  
Observations \_\_\_\_\_
9. Did you enjoy having the device available? \_\_\_\_\_ YES \_\_\_\_\_ NO  
Why, or why not? \_\_\_\_\_
10. Was the program well written; that is, did it teach keyboard skill effectively? \_\_\_\_\_ YES \_\_\_\_\_ NO  
Please comment on: Was the material in logical order?  
Was it consistent with good teaching practice?  
Were the items taught valid?  
Were the units of the right length?  
Observations and suggestions: \_\_\_\_\_

11. Were the systems generally problem-free for students?

\_\_\_ YES \_\_\_ NO

Comment \_\_\_\_\_  
\_\_\_\_\_

12. Did the students show or express approval, positive interest or enjoyment regarding use of the system?

\_\_\_ YES \_\_\_ NO

Give examples \_\_\_\_\_  
\_\_\_\_\_

13. In your view, did the students benefit from the use of the system?

\_\_\_ YES \_\_\_ NO

Explain \_\_\_\_\_  
\_\_\_\_\_

14. Did all students benefit equally from using the system?

\_\_\_ YES \_\_\_ NO

Please explain if some students benefited more or less, and why they did so \_\_\_\_\_  
\_\_\_\_\_

15. Do you believe the system is worth adopting for use in Army typing classes?

\_\_\_ YES \_\_\_ NO

Why, or why not? \_\_\_\_\_  
\_\_\_\_\_

16. In your own words, explain what you believe to be the merits or limitations of this system:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

17. What elements of the system, or the program, could be improved to help you as an instructor?

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

18. If you were able completely to reorganize typing instruction for the Army, in the light of the experience you have had with this device ( \_\_\_\_\_ ) what would you do?

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Table A1. ANOVA of Educational Level for Four Treatments--Basic Students

Source of variance	Degrees of freedom	Sum of squares	Mean squares	F	p
Between Groups	3	5.13	1.71	.91	<.4338
Within Groups	464	868.11	1.87		
Total	467	873.25			

Table A2. ANOVA of Reading Level for Four Treatments--Basic Students

Source of variance	Degrees of freedom	Sum of squares	Mean squares	F	p
Between Groups	3	2,423.76	807.92	1.87	<.1334
Within Groups	424	182,866.05	431.29		
Total	427	185,289.81			

Table A3. ANOVA of Entry Typing for Four Treatments--Basic Students

Source of variance	Degrees of freedom	Sum of squares	Mean squares	F	p
Between Groups	3	101.09	33.70	2.16	<.0917
Within Groups	464	7,230.34	15.58		
Total	467	7,331.43			



Table A4. ANOVA of Educational Level for Three Treatments--Advanced Students

Source of variance	Degrees of freedom	Sum of squares	Mean squares	F	p
Between Groups	2	7.14	3.57	3.25	<.0403*
Within Groups	307	337.65	1.10		
Total	346	344.78			

Table A5. ANOVA of Reading Level for Three Treatments--Advanced Students

Source of variance	Degrees of freedom	Sum of squares	Mean squares	F	p
Between Groups	2	963.16	481.58	1.25	<.2876
Within Groups	215	82,616.04	384.26		
Total	217	83,579.19			

Table A6. ANOVA of Entry Typing for Three Treatments--Advanced Students

Source of variance	Degrees of freedom	Sum of squares	Mean squares	F	p
Between Groups	2	3,678.21	1,839.10	37.74	<.0000*
Within Groups	296	14,425.66	48.74		
Total	298	18,103.87			

\*statistically significant

Table A7. ANOVA of Day Absent for Four Treatments--Basic Students

Source of variance	Degrees of freedom	Sum of squares	Mean squares	F	p
Between Groups	3	500.63	166.88	5.61	<.0009*
Within Groups	462	13,743.51	29.75		
Total	465	14,244.14			

Table A8. ANOVA of Days Absent for Three Treatments--Advanced Students

Source of variance	Degrees of freedom	Sum of squares	Mean squares	F	p
Between Groups	2	25.41	12.71	.94	<.3917
Within Groups	312	4,216.64	13.51		
Total	314	4,242.05			

Table A9. ANOVA of High Score in NWPM for Four Treatments--Basic Students

Source of variance	Degrees of freedom	Sum of squares	Mean squares	F	p
Between Groups	3	108.11	36.04	.65	<.5831
Within Groups	463	25,660.67	55.42		
Total	466	25,768.77			

\*statistically significant

Table A10. ANOVA of High Score in NWPM for Three Treatments--Advanced Students

Source of variance	Degrees of freedom	Sum of squares	Mean squares	F	p
Between Groups	2	2,466.26	1,233.13	17.29	<.0000*
Within Groups	312	22,246.37	71.30		
Total	3.4	24,712.62			

Table A11. ANOVA of End-of-Course Test Scores for Four Treatments--Basic

Source of variance	Degrees of freedom	Sum of squares	Mean squares	F	p
Between Groups	3	106.96	35.65	2.96	<.0327*
Within Groups	289	3,483.42	12.05		
Total	292	3,590.38			

Table A12. ANOVA of End-of-Course Test Scores for Three Treatments--Advanced

Source of variance	Degrees of freedom	Sum of squares	Mean squares	F	p
Between Groups	2	2,081.03	1,040.51	19.04	<.0000*
Within Groups	285	15,575.29	54.65		
Total	287	17,656.31			

\*statistically significant

Table A13. ANOVA of Days to Reach 15 NWPM for Four Treatments--Basic Students

Source of variance	Degrees of freedom	Sum of squares	Mean squares	F	p
Between Groups	3	155.41	51.80	1.67	<.1736
Within Groups	430	13,368.17	31.09		
Total	433	13,523.58			

Table A14. ANOVA of Days to Reach 25 NWPM for Four Treatments--Basic Students

Source of variance	Degrees of freedom	Sum of squares	Mean squares	F	p
Between Groups	3	341.13	113.71	1.02	<.3834
Within Groups	361	40,215.91	111.40		
Total	364	40,557.05			

Table A15. ANOVA of Days from 15 to 25 NWPM for Four Treatments--Basic Students

Source of variance	Degrees of freedom	Sum of squares	Mean squares	F	p
Between Groups	3	155.93	51.98	.77	<.5093
Within Groups	361	24,253.39	67.18		
Total	364	24,409.32			

Table A16. ANOVA of Day of High Score for Four Treatments--Basic Students

Source of variance	Degrees of freedom	Sum of squares	Mean squares	F	p
Between Groups	3	1,139.62	379.87	3.49	<.0158*
Within Groups	463	50,434.72	108.93		
Total	466	51,574.34			

Table A17. ANOVA of Total Training Days for Four Treatments--Basic Students

Source of variance	Degrees of freedom	Sum of squares	Mean squares	F	p
Between Groups	3	1,849.31	616.44	5.87	<.0006*
Within Groups	462	48,490.75	104.96		
Total	465	50,340.06			

Table A18. ANOVA of Days to Reach 15 NWPM--Advanced Students

Source of variance	Degrees of freedom	Sum of squares	Mean squares	F	p
Between Groups	2	.13	.07	.51	<.6003
Within Groups	313	41.02	.13		
Total	315	41.15			

\*statistically significant

Table A19. ANOVA of Days to Reach 25 NWPM--Advanced Students

Source of variance	Degrees of freedom	Sum of squares	Mean squares	F	p
Between Groups	2	198.63	99.31	8.57	< .0002*
Within Groups	310	3,592.65	11.59		
Total	312	3,791.28			

Table A20. ANOVA of Days from 15 to 25 NWPM--Advanced Students

Source of variance	Degrees of freedom	Sum of squares	Mean squares	F	p
Between Groups	2	190.87	95.43	8.58	< .0002*
Within Groups	310	3,450.03	11.13		
Total	312	3,640.89			

Table A21. ANOVA of Days from 15 to 35 NWPM--Advanced Students

Source of variance	Degrees of freedom	Sum of squares	Mean squares	F	p
Between Groups	2	1.50	.75	.02	< .9813
Within Groups	205	8,137.21	39.69		
Total	207	8,138.71			

\*statistically significant

Table A22. ANOVA of Days from 15 to 45 NWPM--Advanced Students

Source of variance	Degrees of freedom	Sum of squares	Mean squares	F	p
Between Groups	2	5.45	2.73	.06	<.9430
Within Groups	69	3,201.53	46.40		
Total	71	3,206.98			

Table A23. ANOVA of Day of High Score--Advanced Students

Source of variance	Degrees of freedom	Sum of squares	Mean squares	F	p
Between Groups	2	1,493.91	746.95	22.93	<.0000*
Within Groups	312	10,162.74	32.57		
Total	314	11,656.64			

Table A24. ANOVA of Total Training Days--Advanced Students

Source of variance	Degrees of freedom	Sum of squares	Mean squares	F	p
Between Groups	2	3,922.59	1,961.29	89.53	<.0000*
Within Groups	312	6,834.74	21.91		
Total	314	10,757.33			

\*statistically significant

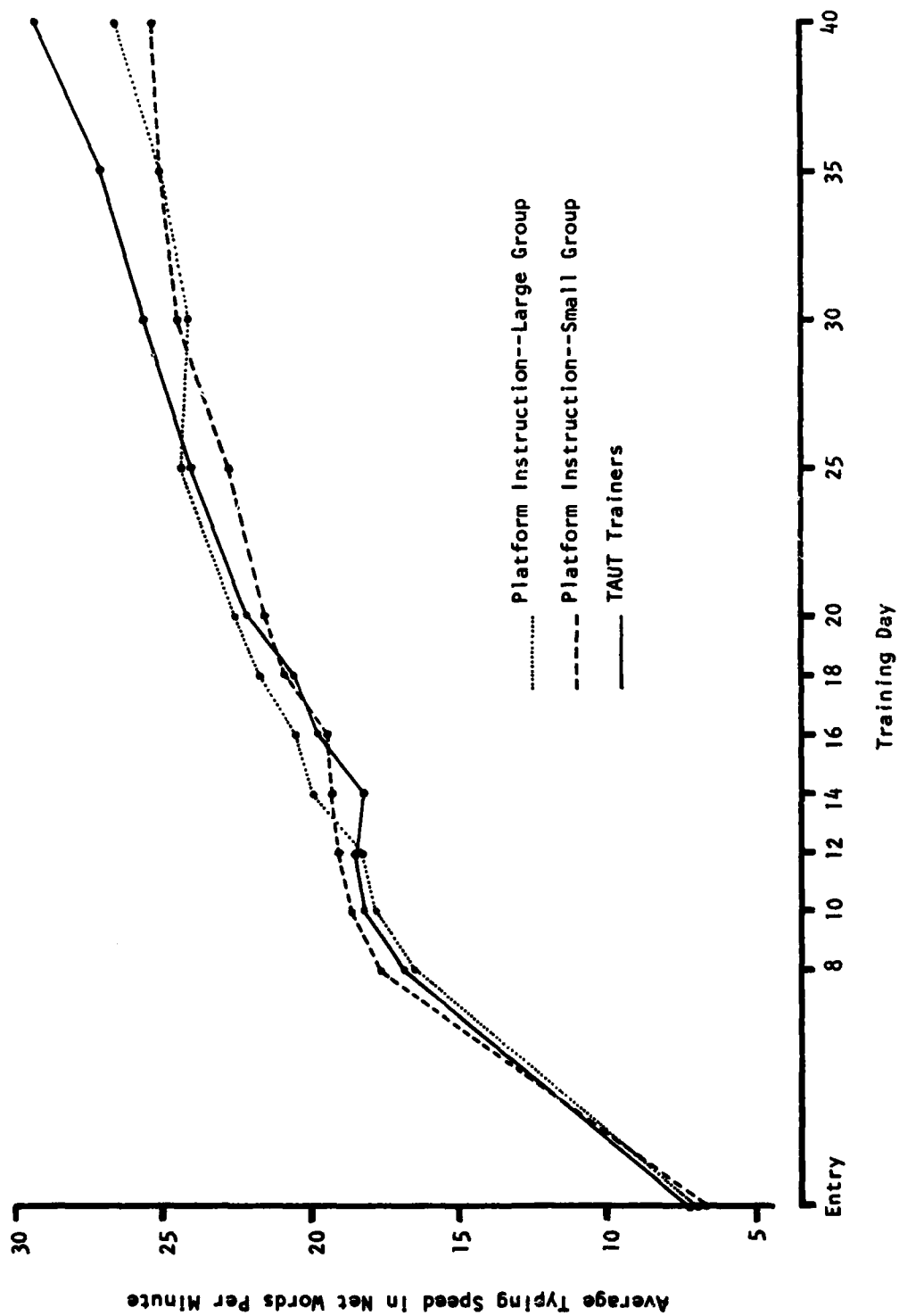


Figure A1. Preliminary Learning Curves Derived from Unadjusted Basic Student Means



DATE  
TIME